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ABSTRACT

This curriculum guide provides materials for a competency-based course in marine trades at the secondary level. The curriculum design uses the curriculum infused model for the teaching of basic skills as part of vocational education and demonstrates the relationship of vocationally related skills to communication, mathematics, and science knowledge. Basic skills matrices are provided that indicate the curriculum in which each skill is studied. A list of course objectives precedes the curriculum. Course materials are divided into units, each of which correlates task, theory, communication skills, mathematics skills, science knowledge, and student outcomes. Units include orientation to marine engine and boat repair; shop practice; electricity; two- and four-stroke engine theory and construction; inboard engine ignition, fuel, cooling, lubrication, electrical systems; inboard engine maintenance and tune-up; inboard engine power transmission; propellers; stern drives; parts specialist; wooden hull repair; oxyacetalene equipment and procedures; corrosion control; diesel marine engines; outdoor boat yard operations; outboard motor powerhead construction and maintenance; outboard motor ignition, fuel, cooling, charging systems; outboard motor gearcases; outboard motor installation and maintenance; outboard motor troubleshooting and estimating; fiberglass hull repairs; boating fundamentals; and on-the-water activities. (YLB)

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Ocean County Vocational-Technical Schools

Marine Trades

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PHILOSOPHY OF EDUCATION

The Ocean County Vocational-Technical Education Program should consist of those courses, activities and experiences which are designed to prepare students for a successful entrance in a given field of work. The program should be based upon an analysis of the worker needs of the field of work, the opportunities and requirements for entrance, and the particular characteristics and needs of the students.

We believe that:

The school should educate and train the students to live effectively in our ever-changing world.

The school should provide, for each student, intensive training toward general and specific job objectives, and setting standards of performance in keeping with the requirements of that particular field of work.

All students should evidence the interest, aptitude, and ability to profit from the specialized instruction, and this should be a condition of entrance into or continuance in a given field of work.

Equal attention should be given in the school program to develop sound character, good citizenship, ability to think critically, and maintain good mental and physical health.

The school must be constantly striving to fulfill its ultimate purpose; that of serving the students and the community. The school should give careful consideration to the needs, interests, and capacities of the students and the educational and technical background, experience, training, and professional interest of the professional staff as they develop a working philosophy of education.

PREFACE

The curriculum format employed by this project is competency based and utilizes the Ocean County Vocational-Technical Schools' curriculum infused model for the teaching of basic skills as part of vocational education. The design demonstrates the relationship of vocationally related skills to communication, mathematics and science knowledge. Proficiencies with regard to student outcomes cannot be achieved without mastery in related academic areas. All student outcome objectives are predicated upon entry level skills which reflect the dictates of the job marketplace and industry. In addition, basic skills matrices developed by the district and vocational skill profiles are included. The totality of this package is designed to facilitate the vocational teaching process and to enhance the learning experiences of our students.

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
AIR CONDITIONING, REFRIGERATION AND HEATING	900	140	120	120	520
AUTO BODY REPAIR	900	130	120	125	525
AUTOMOTIVE MECHANICS	900	150	120	120	510
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	900	216	126	125	433
BEAUTY CULTURE I AND II	1000	240	120	164	476
BUILDING TRADES	900	135	120	130	515
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	450	200	60	40	150
CHILD CARE AIDE	900	240	120	122	418

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
COMMERCIAL ART AND PRINTING CAREERS	900	120	125	75	580
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	900	130	125	130	515
COMMERCIAL PHOTOGRAPHY & TELEVISION PRODUCTION	900	150	125	80	545
CUSTOM CABINETMAKING AND DESIGN	900	130	120	60	590
DENTAL ASSISTING	450	168	65	77	140
DESIGN DRAFTING	900	135	150	165	450
ELECTRICAL TRADES	900	106	120	124	550
FOOD SERVICES	900	206	132	125	437

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COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
INDUSTRIAL AUTOMATION AND ELECTRONICS	900	129	140	132	499
INTERIOR ARCHITECTURE AND DESIGN	900	210	130	120	440
LANDSCAPING AND GREENHOUSE TECHNOLOGY	900	125	125	175	475
MACHINE SHOP TRADES	900	129	120	70	581
MARINE ENGINE AND BOAT SERVICE	900	164	120	125	491
MEDICAL-DENTAL RECEPTIONIST	450	173	60	77	140
MEDICAL SKILLS AND RELATED HEALTH CAREERS	450	135	65	125	125
MEDICAL SKILLS (ADVANCED)	450	125	60	125	140

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
PLUMBING AND HEATING	900	140	120	120	520
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	900	125	130	60	585
T.V. AND COMPUTER REPAIR	900	125	150	175	450
WELDING	900	135	120	100	545

COMMUNICATION SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. The asterisk indicates that the topic is studies in that curriculum.

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact-Opinion Distinction	Signal Words	Parts of Textbook/Manual	Following Directions	Outlining and Notetaking	Interpretation Maps, Graphs & Charts	Interpretation Diagrams, etc.	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communication	Study Skills	Resume Writing	Job Application Skills
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
AUTO BODY REPAIR	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
AUTO MECHANICS	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
AUTOMOTIVE & DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*		*	*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*
BUILDING TRADES	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*	*	*	*	*	*	*		*		*	*		*		*	*		*	*
CHILD CARE AIDE	*	*	*	*	*	*	*		*	*	*		*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*		*	*
COMMERCIAL BUILDING CONSTRUCTION	*	*	*		*	*	*		*	*	*	*		*			*		*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*		*	*
CUSTOM CABINETMAKING AND DESIGN	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
DENTAL ASSISTING	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*		*	*

COMMUNICATION SKILLS CONTINUED

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact-Opinion Distinction	Signal Words	Parts of Textbook/Manual	Following Directions	Outlining and Notetaking	Interpretation Maps, Graphs, Charts	Interpretation Diagrams, etc.	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communication	Study Skills	Resume Writing	Job Application Skills
DESIGN DRAFTING	*	*	*		*	*	*		*	*	*	*		*	*				*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*			*	*
FOOD SERVICES	*	*	*		*	*			*		*	*		*	*		*		*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*		*	*			*		*	*		*	*		*		*	*
INTERIOR ARCHITECTURE AND DESIGN	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*		*	*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*	*		*	*	*	*		*	*		*		*	*
MACHINE SHOP TRADES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*		*	*	*	*	*	*	*	*		*	*				*	*
MEDICAL-DENTAL RECEPTIONIST	*	*	*	*	*	*	*		*	*	*	*		*		*	*	*	*	*
MEDICAL SKILLS AND RELATED HEALTH CAREER	*	*	*	*	*	*	*		*	*	*	*		*		*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*	*		*	*	*	*		*		*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*		*	*				*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*	*	*	*	*		*	*				*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*	*		*	*		*	*				*	*
WELDING	*	*	*			*	*		*	*	*	*		*	*				*	*

MATHEMATICS SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits at your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Function	Graphs
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*	*	*	*	*	*	*	*	*		*
AUTO MECHANICS	*	*	*	*	*	*	*	*	*			*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*			*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*		*	*		*			*			*
CHILD CARE AIDE	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*		*	*	*		*
COMMERCIAL BUILDING CONSTRUCTION	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*		*			*	
CUSTOM CABINETMAKING AND DESIGN	*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*		*				*

MATHEMATICS SKILLS CONTINUED

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigo-metric Function	Graphs
DESIGN DRAFTING	*	*	*	*	*	*		*	*	*	*	
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*		*
FOOD SERVICES	*	*	*	*	*			*	*			*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*	*	*	*	*	*	*	*	*	*
INTERIOR ARCHITECTURE AND DESIGN	*	*	*	*	*	*		*	*			*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*		*			*	*
MACHINE SHOP TRADES	*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*	*	*	*		*			*	*
MEDICAL-DENTAL RECEPTIONIST	*	*	*	*	*	*	*	*	*	*		*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*			*	
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*			*	
PLUMBING AND HEATING	*	*	*	*	*	*		*			*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*		*			*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*			*	*
WELDING	*	*	*	*	*	*		*			*	*

SCIENCE SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits at your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	Systems of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
AIR CONDITIONING, REFRIGERATION AND HEATING							*	*	*	*	*	*			*	*				*	*	
AUTO BODY REPAIR								*	*	*	*	*	*	*	*					*		*
AUTO MECHANICS								*		*	*	*	*	*	*	*				*		
AUTOMOTIVE DIESEL AND ENGINE REBUILDING								*		*	*	*		*	*	*	*			*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*					*	*									*	
BUILDING TRADES							*	*	*	*	*	*	*		*	*				*		
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL		*	*	*		*																
CHILD CARE AIDE	*	*	*	*	*	*															*	
COMMERCIAL ART AND PRINTING CAREERS	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*		*	*						*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	N	O	T	A	V	* A	I	* L	A	* B	* L	* E	*		*	*						*
CUSTOM CABINETMAKING AND DESIGN	* N	O	T	A	V	A	I	* L	A	* B	* L	* E			*			*				

SCIENCE SKILLS CONTINUED	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
DENTAL ASSISTING	*	*	*	*	*	*				*	*	*									*	
DESIGN DRAFTING							*		*	*		*	*		*	*				*		
ELECTRICAL TRADES							*	*	*				*	*	*	*	*		*			
FOOD SERVICES					*	*					*	*							*		*	
INDUSTRIAL AUTOMATION AND ELECTRONICS								*		*			*	*	*	*	*			*		
INTERIOR ARCHITECTURE AND DESIGN		*	*			*	*	*	*	*	*	*	*		*	*						
LANDSCAPING AND GREENHOUSE TECHNOLOGY							*	*	*		*	*						*	*	*		
MACHINE SHOP TRADES										*					*	*				*		
MARINE ENGINE AND BOAT SERVICE								*	*	*	*	*	*	*	*					*		
MEDICAL-DENTAL RECEPTIONIST	N	* O	* T	* A	* V	* A	I	L	A	B	* L	E										
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*				*	*										*	
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*				*	*										*	
PLUMBING AND HEATING								*	*	*	*	*			*					*		
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*	*	*					*		
T.V. AND COMPUTER REPAIR										*	*	*	*	*	*	*						
WELDING								*		*	*	*		*	*					*		

COURSE OBJECTIVES

1. To prepare students with entry level skills, abilities and knowledge for employment in the marine trades.

2. To present 900 hours of instruction and practice in the marine trades in accordance with the course curriculum and skill profile outline.

3. To provide a detailed summary evaluation of the proficiency achieved by each student representing the most important content areas presented in the marine trades skill profile.

4. To help each student develop positive attitudes and ideals related to their occupation in the marine trades and understand their own capabilities and potential.

5. To instill in each student the need to plan for their professional growth through continuous learning in their chosen occupation.

STUDENT ACTIVITIES

All students enrolled in the Ocean County Vocational-Technical School are encouraged to join Vocational Industrial Clubs of America (VICA). Student activities are infused into each program. Each building has a student government and a student activities program separate from VICA. Additionally, students from each center and every class are encouraged to participate in the VICA Leadership and Job Demonstration Contests which begin in the centers and radiate throughout the district as Ocean County Vocational-Technical School inter school winners are chosen.

Student activities emphasize the basic precepts of VICA, as well as, the basic tenets of democracy. Within that context, each of our programs teaches the dignity of work, high standards in trade ethics and safety, and a belief in the free enterprise economic system.

UNIT: ORIENTATION TO MARINE ENGINE AND BOAT REPAIR

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Identifying and analyzing school policies and rules	A. Instructional units B. Grading system C. Student personnel system D. Firedrill procedure E. Student handbook F. Job description G. General safety regulations H. Student attendance contract I. Cooperative Industrial Education (CIE) program J. Vocational Industrial Clubs of America (VICA) K. Resume and job application L. Orientation quiz	A. Oral communication B. Writing skills C. Functional reading skills D. Vocabulary E. Following directions F. Fact/Opinion distinction G. Test taking skills	A. Whole numbers B. Decimals C. Percentages	A. Flammable, toxic and volitile chemicals B. Toxic fumes resulting from a fire	A. The student will be able to delineate the units of instruction B. The student will be able to describe the grading system C. The student will be able to demonstrate a safe and orderly exit D. The student will be able to interpret the student handbook E. The student will be able to descirbe the role of a marine mechanic F. The student will be able to delineate the General Safety Regulations G. The student will be able to describe the CIE program H. The student will be able to define VICA and explain its function I. The student will be able to prepare a resume J. The student will be able to complete a job application K. The student will be able to complete the orientation quiz with 70% accuracy

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Doing shop work and using shop manuals	A. Specifications B. Seven steps of marine shop work C. Trade-in guides and model year guides D. Engine parts catalogs E. Engine service catalogs F. Microfiche card system G. Flat rate manual	A. Functional reading skills B. Vocabulary C. Inferences D. Signal words E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation of graphs and charts I. Interpretation of diagrams, etc. J. Spelling K. Problem solving L. Oral communications M. Test taking skills	A. Whole numbers B. Common fractions C. Decimals D. Weights and measurements E. Ratio and proportion F. Graphs		A. The student will be able to define specification B. The student will be able to list the seven steps of marine shop work C. The student will be able to demonstrate the use of an outboard motor trade-in guide D. The student will be able to demonstrate the use of a marine engine parts catalog E. The student will be able to demonstrate the use of a marine engine service manual F. The student will be able to demonstrate the use of the microfiche card system G. The student will be able to demonstrate the use of a flat rate manual

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
II. Using marine fasteners	A. Machine screw threads B. Types of marine fasteners C. Taps and dies D. Thread restorers E. Helicoil kits F. Removing frozen/seized fasteners	A. Vocabulary B. Following directions C. Problem solving D. Functional reading skills E. Spelling F. Oral communication G. Note taking H. Test taking skills	A. Whole numbers B. Common fractions C. Decimals D. Measurements	A. Heat	A. The student will be able to delineate pitch, diameter and length of machine threads B. The student will be able to identify severa marine fasteners C. The student will be able to differentiate between N.C., N.F., and N.P.T. threads D. The student will be able to demonstrate the use of random taps and dies E. The student will be able to demonstrate the use of random thread restorers F. The student will be able to delineate the purpose of helicoils and demonstrate the installation of same G. The student will be able to demonstrate the removal of broken or seized machine screws

UNIT: SHOP PRACTICE - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Using shop hand tools safely	A. Marine mechanics' common hand tools B. Torque wrenches C. Safety	A. Vocabulary B. Following directions C. Oral communication D. Note taking	A. Common fractions B. Measurements		A. The student will be able to identify as to correct name, function care and use of 70% of all hand tools in the lab
IV. Using shop power tools safely	A. Safety 1. Ginder 2. Drill press 3. Portable drill 4. Band saw 5. Sabre saw 6. Sanders 7. Circular saw 8. Cut-off saw	A. Functional reading skills B. Vocabulary C. Followikg directions D. Oral communication E. Note taking F. Test taking skills			A. The student will be able to delineate the eighteen safety rules using the information sheet provided B. The student will be able to identify the basic parts of the power tools discussed in class C. The student will be able to complete the safety examination for each power tool D. The student will be able to demonstrate th proper use of each power tool discussed in class

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Using measuring tools	A. Types of measuring tools B. Degree of accuracy or precision C. Carpenters' folding rule D. Machinists' scale E. Calipers F. Sliding caliper rule G. Feeler gauge H. Micrometer 1. Inside 2. Outside I. Dial indicator	A. Vocabulary B. Following directions C. Problem solving D. Spelling E. Oral communication F. Note taking G. Test taking skills	A. Whole numbers B. Common fractions C. Decimals		A. The student will be able to differentiate between the various measuring instruments used in the lab and demonstrate the use of each B. The student will be able to demonstrate the proper use of a 0 - 1" micrometer C. The student will be able to demonstrate the proper use of a dial indicator in checking drive shaft run-out

UNIT: ELECTRICITY

TOPIC: INTRODUCTION AND ELECTRICAL TERMS

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
	A. What is electricity? B. Electron theory C. Producing a voltage	A. Vocabulary B. Identifying main ideas C. Signal words D. Note taking E. Oral communication		A. Chemical reactions to produce a voltage B. Relationship of magnetism and electricity	A. The student will be able to describe in lay language the flow of electricity B. The student will be able to list six methods of producing a voltage
	A. Glossary of terms B. Ohm's Law	A. Functional reading skills B. Vocabulary C. Inferences D. Spelling	A. Whole numbers B. Decimals C. Formulas		A. The student will be able to define in lay language a random selection of electrical terms from information sheet provided B. The student will be able to use the formula for Ohm's Law and compute random hypothetical problems

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analyzing magnetic induction	A. Relationship of magnetism to electricity and vice versa B. Producing a voltage from magnetism C. Principles of operation 1. Induction coil 2. Alternator 3. Solenoids 4. Test equipment	A. Vocabulary B. Fact/Opinion distinction C. Note taking D. Oral communication E. Test taking skills		A. Magnetism and electricity	A. The student will be able to explain the relationship of magnetism to electricity and vice versa B. The student will be able to list three criteria necessary to produce a voltage by magnetic induction C. The student will be able to delineate the theory of operation o a solenoid or magneti relay
II. Using wiring diagrams and determining wire and fuse sizes	A. Safe installation of electrical accessories and liability B. Wire size chart C. Fuse capacity chart D. Color coding E. Diagrams/Schematics	A. Functional reading skills B. Vocabulary C. Following directions D. Interpretation of charts E. Problem solving	A. Whole numbers B. Percentages		A. The student will be able to design two simple circuits using the wire and fuse charts provided B. The student will be able to trace two circuits of an outboard motor using schematic provided

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Running light wiring and troubleshooting	A. Schematic three wire hook-up for inland running lights B. Troubleshooting using a voltage probe and continuity light	A. Vocabulary B. Following directions C. Interpretation of wiring diagrams D. Problem solving		A. Electricity	A. The student will be able to wire the bow light, stern light and three position switch on a boat mock-up B. The student will be able to troubleshoot random electrical problems on the boat mock-up
IV. Using meters (V.O.A.) and testers	A. Voltmeter 1. Theory of operation 2. Meter connections 3. Uses B. Ammeter 1. Theory of operation 2. Meter connections 3. Uses C. Ohm meter 1. Theory of operation 2. Meter connections 3. Uses D. Safety precautions E. Induction meters F. Voltage probe G. Continuity tester	A. Vocabulary B. Following directions C. Interpretation of meter scales D. Problem solving	A. Whole numbers B. Decimals C. Measurements (electrical)	A. Magnetism and electricity	A. The student will be able to demonstrate the proper use of a V.O.A. meter on a basic circuit and record all readings B. The student will be able to demonstrate the use of a voltage probe in locating "hots" and "grounds" C. The student will be able to test a fuse, switch and wire using a continuity light or meter

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Working with a storage battery	A. Operation/Construction B. Three major functions C. Rating criteria D. Specific gravity (state of charge) E. Charging F. Testing G. Care and maintenance H. Safety	A. Functional reading skills B. Vocabulary C. Following directions D. Note taking E. Interpretation of charts F. Test taking skills G. Problem solving H. Oral communication	A. Whole numbers B. Decimals C. Percentages D. Ratio and proportion	A. Chemical reactions B. Heat	A. The student will be able to describe the theory of operation of a lead acid storag battery B. The student will be able to list the thre major functions of a battery C. The student will be able to delineate the rating system used fo batteries using the manufacturer's specification sheet D. The student will be able to use a hydrometer and specific gravity sheet to determine the state of charge of a storage battery E. The student will be able to charge a battery using a fast charger F. The student will be able to test a batter to determine conditio or a dead cell G. The student will be able to service and prepare a battery for winter storage H. The student will be able to complete a written test on storage batteries with 70%

UNIT: TWO AND FOUR STROKE ENGINE THEORY AND CONSTRUCTION

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Introduction to internal combustion engines and service	A. Define a marine engine mechanic B. Qualities of a marine mechanic C. Delineate how the boat owner can help the marine mechanic D. An internal combustion engine is an energy conventer	A. Vocabulary B. Functional reading skills C. Oral communication D. Note taking		A. Heat and expansion of gases B. Reciprocating motion C. Rotary motion	A. The student will be able to delineate a marine mechanic B. The student will be able to list the three basic qualities that determine a marine mechanic C. The student will be able to describe an internal combustion engine D. The student will be able to list five types of marine engines used in pleasure crafts
II. Work and horsepower	A. Define an engine B. Define potential and kinetic energy C. Define work and horsepower D. Give formula for work and horsepower E. Define torque F. Torque/Horsepower	A. Vocabulary B. Fact/Opinion distinction C. Note taking D. Problem solving E. Oral communication	A. Whole numbers B. Decimals C. Ratio and proportion D. Formulas	A. Potential and kinetic energy B. Study of motion, power and torque in machines	A. The student will be able to differentiate between kinetic and potential energy B. The student will be able to delineate an engine and a machine C. The student will be able to differentiate between torque and horse power D. The student will be able to compute the required horsepower for two hypothetical problems

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Analyzing four stroke cycle principle (how power is produced)	A. Three systems necessary to start an engine B. Producing power (otto cycle) C. Compression ration versus power produced D. Four stroke cycle principle E. Bore and stroke	A. Vocabulary B. Note taking C. Oral communication D. Inferences E. Parts of textbook/ manual F. Interpretation of diagrams G. Spelling	A. Ration and proportion B. Whole numbers C. Formulas D. Measurements	A. Applied chemistry Compression of gases to obtain power B. Heat of compressed gases C. Movement of gases to overcome gravity D. Fuels	A. The student will be able to list and delineate the three systems necessary to start an engine B. The student will be able to illustrate a piston in a cylinder and I.D. bore and stroke C. The student will be able to delineate compression ratio D. The student will be able to illustrate the four stroke cycle principle
IV. Classifying engines	A. Cylinder arrangement B. Valve location C. Bore and stroke D. Cubic inch displacement (C.I.D.)	A. Vocabulary B. Parts of textbook/ manual C. Note taking D. Interpretation of diagrams E. Problem solving F. Spelling G. Oral communication	A. Whole numbers B. Ratio and proportion C. Formulas D. Measurement		A. The student will be able to list, define and give examples of the four areas used to classify marine four stroke cycle engines

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Identifying four essential auxiliary systems	A. Fuel system B. Ignition system C. Coding system D. Lubrication system	A. Vocabulary B. Parts of textbook C. Note taking D. Oral communication		A. Fuel/Air mixture combustability B. Electricity to ignite fuel/air charge C. Properties of a lubricating oil	A. The student will be able to list the four essential engine auxiliary systems B. The student will be able to delineate the function of each system
VI. Passing quiz on engine theory and construction		A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Test taking skills			A. The student will be able to complete a written test with 70% accuracy
VII. Studying history of the outboard motor	A. Growth of the industry B. Refinements in design and engineering C. Imports and their impact	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction			A. The student will be able to examine and/or observe a pictorial history of the outboard motor B. The student will be able to prepare a list of the horsepower ranges produced by Evinrude, Johnson and Mercury C. The student will be able to prepare a list of imported outboard motors and the largest horsepower of each manufacturer

UNIT: TWO AND FOUR STROKE ENGINE THEORY AND CONSTRUCTION - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VIII. Terminology of outboard motors	A. Powerhead parts and function B. Lower unit parts and function	A. Vocabulary B. Oral communication C. Note taking			A. The student will be able to identify and list the major components of a random outboard motor B. The student will be able to briefly describe in lay language the function of each part or assembly
IX. Analyzing the two stroke cycle principle	A. Two stroke cycle principle B. Transfer, intake and exhaust parts C. Reed valves D. Weight to horsepower ratio E. Two stroke versus four stroke	A. Vocabulary B. Identifying main ideas C. Parts of textbook/ manual D. Note taking E. Interpretation of diagrams F. Oral communication	A. Ratio and proportion	A. Applied chemistry Compression of gases to obtain power B. Heat of compressed gases C. Movement of gases to overcome gravity D. Fuels	A. The student will be able to illustrate and describe the two stroke cycle principl
X. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: INBOARD ENGINE IGNITION SYSTEMS

TOPIC: INTRODUCTION TO INBOARD ENGINE IGNITION SYSTEMS

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding and using inboard engine ignition systems	A. Functions of an ignition system 1. Provide properly timed spark to ignite fuel/air mixture 2. Distribute to all cylinders in proper sequence 3. Provide automatic advance/retard through all R.P.M.'s B. Types of systems 1. Battery 2. Magneto 3. Electronic C. Marine versus automotive	A. Functional reading skills B. Vocabulary C. Parts of textbook/ manual D. Note taking E. Oral communication	A. Measurements B. Graphs Voltage rise time comparison	A. Magnetism and electricity Spark plug	A. The student will be able to delineate the function of an ignition system on a marine four stroke gasoline engine B. The student will be able to list and compare the three types of ignition systems found on marine inboard engines

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
II. Understanding and using battery ignition components/operation	A. System components B. 1. Primary 2. Secondary B. Primary circuit - theory of operation C. Secondary circuit - theory of operation D. Safety	A. Functional reading skills B. Vocabulary C. Inferences D. Parts of textbook/ manual E. Note taking F. Interpret diagrams G. Problem solving		A. Magnetism and electricity Producing high secondary voltage by magnetic induction	A. The student will be able to list the components of a battery ignition system and describe the basic function of each B. The student will be able to delineate the theory of operation of a battery ignition systems primary and secondary circuits
III. Using wiring schematic/coil polarity	A. Schematic of battery ignition system B. Operation of ballast resistor/by pass C. Coil polarity 1. Effects of positive and negative polarity 2. Determining polarity D. Safety	A. Vocabulary B. Fact/Opinion distinction C. Parts of textbook/ manual D. Following directions E. Note taking F. Interpretation of graphs and charts G. Problem solving H. Oral communication	A. Percentages	A. Magnetism and electricity Factors affecting electrical output produced by magnetic induction	A. The student will be able to illustrate and correctly label a typical battery ignition system incorporating a ballast resistor B. The student will be able to use a voltmeter to determine coil polarity C. The student will be able to change or correct polarity of a battery ignition syster

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
IV. Understanding and using ignition timing	A. Engine rotation B. Distribution rotation C. Firing order D. Setting breaker points 1. Dwell 2. Gap E. Timing methods 1. Power time 2. Timing light 3. Static time F. Checking centrifugal advance mechanism G. R and R Distributor H. Safety	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Note taking F. Interpreting graphs and charts G. Problem solving H. Oral communication	A. Whole numbers B. Decimals C. Measurements	A. Light (strobe)	A. The student will be able to differentiate between right and left hand engines B. The student will be able to determine the firing order of a four cylinder engine withou the use of a specifica tion sheet C. The student will be able to set dwell and timing of an inboard engine using appropri-ate meter and service manual D. The student will be able to R and R the distributor of an in-board engine and correctly time engine

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Troubleshooting common related ignition system problems	A. Pre-ignition B. Detonation C. Cross fire/induction firing D. Spark plub analysis	A. Functional reading B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Note taking G. Interpretation of diagrams H. Problem solving I. Oral communication		A. Heat Effects of high temperatures due to abnormal engine operation B. Fuels Proper octane rating of gasoline	A. The student will be able to delineate pre-ignition and detonation and list the causes and effects of each B. The student will be able to delineate cross fire and or induction firing C. The student will be able to identify various engine problems using a spark plug comparison chart
VI. Doing ignition primary circuit checks	A. Voltage drop (V.D.) testing for high resistance connections 1. Distributor 2. Ignition switch and ballast resistor 3. Ignition coil primary B. Testing for proper resistor and ignition coil (ammeter)	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Note taking F. Interpretation of diagrams G. Problem solving H. Oral communication	A. Whole numbers B. Decimals C. Computation D. Measurements		A. The student will be able to perform voltage drop tests of the battery ignition system primary circuit to isolate potential trouble spots B. The student will be able to check for proper ignition coil and ballast resistor

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VII. Working with the electronic ignition system	A. Primary circuit components B. Electronic versus battery system C. Primary circuit troubleshooting with a voltmeter D. Safety	A. Functional reading skills B. Vocabulary C. Parts of manual D. Note taking E. Interpretation of diagrams F. Oral communication		A. Magnetism and electricity Magnetic induction	A. The student will be able to identify a marine engine utilizing electronic ignition B. The student will be able to perform primary circuit checks with a voltmeter
VIII. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete the written test with 70% accuracy

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding inboard engine fuel system	A. Fires and explosions B. Fire hazards and safety precautions C. Ventilation systems D. Fuel (gasoline) E. Typical fuel system F. Fuel system maintenance G. Fire extinguishers	A. Vocabulary B. Fact/Opinion distinction C. Parts of manual D. Following directions E. Note taking F. Problem solving G. Oral communication	A. Weights and measurements B. Ratio and proportion	A. Gravity Weight of gasoline fumes B. Applied chemistry volitile fuels and solvents	A. The student will be to delineate the fueling safety precautions discussed in class B. The student will be able to describe the function and operation of an inboard engine ventilation system C. The student will be able to list components or parts to consider when servicing the fuel system D. The student will be able to demonstrate the use of a dry chemical fire extinguisher on a class "B" fire
II. Utilizing the four cycle carburetor theory	A. Function of a carburetor B. Venturi principle C. Troubleshooting priority D. Fuel mixture ratios	A. Vocabulary B. Parts of manual C. Note taking D. Problem solving E. Oral communication	A. Ratio and proportion	A. Venturi principle B. Atmospheric pressure	A. The student will be able to delineate the function of a carbureto B. The student will be able to delineate the venturi principle as it applies to a carburetor C. The student will be able to list the ideal richest and leanest fueling mixtures that will burn

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Identifying and using carburetor circuits	A. Circuits 1. Float 2. Choke 3. Idle 4. Cruising/main metering 5. Maximum power 6. Accelerating B. Carburetor air intakes (three)	A. Vocabulary B. Parts of manual C. Note taking D. Problem solving E. Oral communication		A. Transfer of liquid by pressure differential and mechanical pump B. Atomization of a liquid	A. The student will be able to identify three types of carburetors found on marine engines B. The student will be able to list and describe the theory of operation pertaining to the six carburetor circuits
IV. Passing a written test	A. Specific test instructions B. Two part test 1. Carbureation 2. Fuel supply system	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of inboard engine cooling systems	A. Function of cooling system B. Types of systems 1. Raw water 2. Fresh water C. Components of open (raw) and closed (fresh) water systems D. Cooling system problems	A. Vocabulary B. Fact/Opinion distinction C. Parts of manual D. Note taking E. Interpretation of diagrams F. Oral communication G. Functional reading skills H. Problem solving	A. Percentages Antifreeze B. Ratio and proportion	A. Chemical reactions Mixing antifreeze and water B. Heat/Expansion and contraction Thermostat operation	A. The student will be able to delineate the function of the cooling system B. The student will be able to delineate the two types of cooling systems used on inboard engines and lis the pros and cons of each C. The student will be able to use a line drawing and trace the water flow in a fresh water system D. The student will be able to correct rando problems in the cooling system of an inboard engine
II. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: INBOARD ENGINE LUBRICATION SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding inboard engine lubrication system	A. Demands on oil 1. Speed 2. Load 3. Temperature B. Four functions of an engine C. Viscosity index D. Service classifications	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Note taking F. Oral communication	A. Whole numbers	A. Applied chemistry 1. Oil viscosity 2. Additives B. Heat	A. The student will be able to list the four functions of an engin oil B. The student will be able to explain in la terms the viscosity o an engine oil and the relationship to viscosity index C. The student will be able to list and delineate five servic classifications of engine oil
II. Identifying lubrication system components	A. Typical lube system B. Oil pumps C. Oil filtering system D. Oil coolers E. Crankcase ventilation system F. Oil/filter servics	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Note taking G. Interpreting diagrams H. Oral communication			A. The student will be able to describe the flow of oil in a typical inboard engine system B. The student will be able to describe the purpose and operation of a full flow oil filter and cooler C. The student will be able to list two reasons for a crankcase ventilation syste D. The student will be able to perform an oil and filter change on an inboard engine

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: INBOARD ELECTRICAL SYSTEMS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding the starter circuit	A. System components B. Theory of operation	A. Vocabulary B. Parts of manual C. Note taking D. Interpreting diagrams E. Oral communications		A. Magnetism and electricity 1. Electric motion 2. Magnetic relay	A. The student will be able to list and identify the four major components of a starter system
II. Working with the starter motor	A. Motor components B. Theory of operation C. Motor circuits D. Starter drives	A. Vocabulary B. Parts of manual C. Note taking D. Interpretation of diagrams E. Oral communication		A. Magnetism and electricity Electric motor	A. The student will be able to identify the components of a starter motor B. The student will be able to delineate the theory of operation of a simple two field two brush starter motor C. The student will be able to differentiate between the different motor circuits found on marine engines D. The student will be able to list the three functions of a starter drive

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Working with solenoids and magnetic relays	A. Magnetic switch B. Solenoid switch C. Testing 1. Bench 2. Engine	A. Vocabulary B. Parts of manual C. Following directions D. Note taking E. Interpreting diagrams F. Problem solving G. Oral communication	A. Measurements Electrical	A. Magnetism and electricity Magnetic relays	A. The student will be able to identify and describe the operation of a magnetic switch B. The student will be able to identify and describe the operation of a solenoid switch B. The student will be able to perform bench testing of various solenoids and relays using an ohm meter
IV. Troubleshooting and maintenance of the starter system	A. Starter circuit malfunctions Engine turns over slowly, sluggishly, or not at all B. Meter and visual checks of starter circuit components C. Possible engine problems D. Starter motor internal checks	A. Vocabulary B. Parts of manual C. Following directions D. Note taking E. Interpretating diagrams F. Problem solving G. Oral communication		A. Electricity	A. The student will be able to perform routine or basic troubleshooting of the starter circuit on a live engine B. The student will be able to perform internal visual checks on all components of a starter motor

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Analysis of voltage drop principle and complete analysis of the starter circuit	A. Information sheet pertaining to starter circuit analysis B. Battery state of charge C. Voltage drop (V.D.) of the insulated side of the starter circuit D. Voltage drop across the starter E. Voltage drop of the ground side of the starter circuit F. Voltage drop across the battery G. Summary of test readings or results H. Safety hazards and precautions	A. Functional reading skills B. Vocabulary C. Identifying main ideas D. Following directions E. Problem solving F. Oral communication	A. Whole numbers B. Decimals C. Computation	A. Electricity	A. The student will be able to learn the principles of circuit analysis by using the starter circuit as an example B. The student will be able to obtain a test of the battery for a dead cell C. The student will be able to determine whether there is undesirable resistanc in the insulated side and the ground side o the starter circuit D. The student will be able to determine the voltage drop across the starter

UNIT: INBOARD ELECTRICAL SYSTEMS - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VI. Analysis of alternator	A. Alternator components B. Theory of operation C. Typical alternator circuit D. Types of alternators E. Voltage regulator	A. Vocabulary B. Parts of manual C. Note taking D. Interpreting diagrams E. Oral communication		A. Electricity and magnetism	A. The student will be able to list or identify the main compcnents of an A.C. alternator B. The student will be able to delineate in lay terms the theory of operation of an alternator C. The student will be able to delineate the function of an alternator voltage regulator
VII. Testing alternator circuits and components	A. Testing alternator components B. Circuit tests 1. Alternator or regulator at fault 2. Alternator rated output	A. Vocabulary B. Parts of manual C. Following directions D. Note taking E. Interpreting diagrams F. Problem solving G. Oral communication	A. Measurements Electrical	A. Electricity and magnetism	A. The student will be able to bench test th components of a three phase alternator B. The student will be able to troubleshoot a typical alternator charging circuit and determine if the alternator or regulator is defective

UNIT: INBOARD ELECTRICAL SYSTEMS - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VIII. Troubleshooting alternator problems	A. Information sheet of service precautions B. Troubleshooting check chart	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Interpretation of charts F. Problem solving G. Oral communication		A. Electricity	A. The student will be able to identify, list, or determine the potential dangers in troubleshooting or servicing alternators B. The student will be able to solve several hypothetical problems in the alternator charging system using the troubleshooting chart
IX. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Maintaining an inboard engine (Maintenance and tune-up)	A. Winterization Procedure sheet B. Preventing corrosion C. Reducing scale formation D. Cleaning manifolds and risers E. Tune-up and maintenance Procedure sheet F. Pre-season prep Procedure sheet	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Note taking G. Problem solving H. Oral communication		A. Salt water hazards B. Extreme heat and cold hazards D. Contaminated oil Acids E. Effects of all types of weather on a marine engine	A. The student will be able to winterize an inboard engine B. The student will be able to list the steps a mechanic can take to help prevent corrosion and scale formation in an inboard engine C. The student will be able to remove scale and residue from an inboard engine exhaust manifold and riser D. The student will be able to tune an inboard engine using the information sheet provided E. The student will be able to delineate the procedure to use in the preparation of an inboard engine boat for spring launch

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Utilization of reverse gears	A. Purpose and function B. Types 1. Direct 2. Indirect C. Clutches D. Mechanical gears E. Hydraulic gears F. Reducation gears G. Vee-drives	A. Vocabulary B. Parts of manual C. Note taking D. Interpreting diagrams E. Oral communication	A. Ratio	A. Hydraulics Fluids at work B. Gear reductions Transmission of power and torque	A. The student will be able to delineate the purpose and function of an inboard engine reverse gear B. The student will be able to delineate the operation of a mechanical reverse gear C. The student will be able to delineate the operation of a hydraulic reverse gear D. The student will be able to identify a reduction gear and describe its function E. The student will be able to identify a vee-drive and describe its function

UNIT: INBOARD ENGINE POWER TRANSMISSION - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
II. Utilization of prop shaft and underwater hardware	A. Prop shaft 1. Material 2. Machining B. Engine coupling C. Strut and bearing D. Shaft log and stuffing box E. Shaft alignment F. Prop and shaft maintenance	A. Vocabulary B. Fact/Opinion distinction C. Parts of manual D. Following directions E. Note taking F. Problem solving G. Oral communication	A. Measurements B. Decimals		A. The student will be able to identify and describe the function of the following 1. Engine coupling 2. Strut and bearing 3. Shaft log 4. Stuffing box B. The student will be able to check prop and shaft runout C. The student will be able to correct misalignment of engine and shaft
III. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: PROPELLERS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding marine propellers	A. Key to peak boat and motor performance B. Propeller materials and number of blades C. Right and left handed props D. What makes a propeller work? E. Parts of a propeller	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretation of diagrams H. Problem solving I. Spelling J. Oral communication	A. Whole numbers	A. Matter 1. Liquid 2. Solids B. Gases Air bubbles C. Thrust 1. Actions 2. Reactions	A. The student will be able to identify various propellers as to material, number of blads, parts and rotation B. The student will be able to delineate the theory of operation of a marine screw propeller
II. Sizing a propeller	A. Diameter B. Pitch and progressive pitch C. Rake	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretation of diagrams H. Problem solving I. Spelling J. Oral communication	A. Whole numbers B. Fractions C. Ratio and proportion		A. The student will be able to determine the diameter of several propellers B. The student will be able to delineate pitch and progressive pitch C. The student will be able to delineate blade rake

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Identifying propeller slip	A. Define "slip" B. Calculate the percentage of slip C. Factors causing slippage	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretation of diagrams H. Problem solving I. Spelling J. Oral communication	A. Whole numbers B. Common fraction C. Percentages D. Formulas	A. Weather 1. Wind 2. Tides 3. Currents B. Matter 1. Liquids 2. Gases C. Marine vegetation 1. Grasses 2. Seaweed	A. The student will be able to delineate propeller slip B. The student will be able to calculate the percentage of slip for three hypothetica problems C. The student will be able to list and delineate three factor causing or affecting propeller slip
IV. Analyzing ventilation and cavitation	A. Define ventilation B. Define cavitation C. Common or related conditions	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretation of diagrams H. Problem solving I. Spelling J. Oral communication			A. The student will be able to delineate cavitation and ventilation B. The student will be able to list and delineate factors or conditions that may appear to cause ventilation and/or cavitation

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Analyzing speciality props	A. Identify and briefly describe the uses of the following props 1. Cupped 2. Cleaver 3. Weedless 4. Hi-rake 5. Hi-reverse thrust	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretation of diagrams H. Problem solving I. Spelling J. Oral communication		A. Matter 1. Liquids 2. Solids B. Gases C. Thrust 1. Actions 2. Reactions	A. The student will be able to identify and state the general use of the speciality props discussed in class
VI. Reading the propeller selection chart	A. Sample chart and uses B. Hypothetical prop selections	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretation of diagrams H. Problem solving I. Spelling J. Oral communication	A. Whole numbers B. Fractions		A. The student will be able to choose the correct prop for two or more boat and motor combinations using a propeller selection chart

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VII. Troubleshooting R and R propeller	A. Safety precautions when servicing a prop B. Lube prop shaft D. Pullers D. Propeller problems	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Outlining and note taking G. Interpretationof diagrams H. Problem solving I. Spelling J. Oral communication			A. The student will be able to delineate the safety precaution when servicing propellers B. The student will be able to R and R an outboard motor propeller in accordance with service manual
VIII. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: STERN DRIVES

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding OMC and Mercruiser stern drives	A. Delineate a stern drive B. Nomenclature C. Compare to inboard and outboard engines D. Transmission of power from engine to propeller E. Major manufacturers	A. Vocabulary B. Identifying main ideas C. Inferences D. Fact/Opinion distinction E. Note taking F. Spelling G. Oral communication	A. Ratio and proportion	A. Gear reductions B. Drive trains	A. The student will be able to describe a stern drive unit B. The student will be able to compare a stern drive unit to an inboard and outboard engine boat by listing the pros and cons of each unit C. The student will be able to list the major manufacturers of stern drives
II. Working on Mercruiser stern drives	A. Remove unit from boat or engine B. Disassemble lower gearcase and inspect parts C. Reassemble lower gearcase/shimming D. Disassemble upper gearcase and inspect parts E. Reassemble upper gearcase/shimming F. Engine alignment G. Install drive on boat or engine H. Adjustments 1. Cables 2. Electrical 3. Hydraulic	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Note taking F. Interpretation of diagrams G. Problem solving H. Spelling I. Oral communication	A. Decimals	A. Use of heat (torch) to facilitate disassembly of corroded parts	A. The student will be able to R and R a Mercruiser stern drive from a boat or engine and make necessary adjustments for proper operation B. The student will be able to disassemble, inspect parts, shim and reassemble a Mercruiser upper and lower gearcase

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Working on OMC stern drives	A. Remove unit from boat or engine B. Disassemble lower gear-case and inspect parts C. Reassemble lower gear-case/shimming D. Disassemble upper gear-case and inspect parts E. Reassemble upper gear-case/shimming F. Engine alignment G. Install drive on boat or engine H. Adjustments 1. Cables 2. Electrical 3. Hydraulic	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Note taking F. Interpretation of diagrams G. Problem solving H. Spelling I. Oral communication	A. Decimals	A. Use of heat (torch) to facilitate disassembly of corroded parts	A. The student will be able to R and R an OMC stern drive from a boat or engine and make necessary adjustments for proper operation B. The student will be able to disassemble, inspect parts, shim and reassemble an OMC upper and lower gearcase
IV. Maintaining stern drives	A. Define regular and preventative maintenance B. OMC schedule 1. Seasonal 2. One, two or three year C. Mercruiser schedule 1. Seasonal 2. One, two or three year	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Note taking G. Interpreation of charts H. Problem solving I. Oral communication	A. Measurements Gear oil		A. The student will be able to perform routine maintenance of a Mercruiser and an OMC stern drive unit

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: PARTS SPECIALIST

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Stocking, shipping and receiving	A. Terms and definitions B. Organization of part bin C. Forms of transportation used in shipping parts D. Forms used in shipping parts E. Methods of payment used in shipping and receiving F. Procedure for receiving shipments G. Steps for filling and packing an order	A. Functional reading skills B. Vocabulary C. Signal words D. Parts of textbook E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers B. Decimals C. Percentages D. Weights and measures		A. The student will be able to match terms related to stocking, shipping and receivin with their correct definitions B. The student will be able to list forms of transportation used i shipping parts C. The student will be able to define method of payment used in shipping and receivin parts D. The student will be able to arrange in order the steps for filling and packing an order
II. Inventory control	A. Terms and definitions B. Inventory control systems C. Coding systems for popularity of parts	A. Functional reading skills B. Vocabulary C. Signal words D. Parts of textbook E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers		A. The student will be able to match terms related to inventory control with their correct definitions B. The student will be able to complete a lis of needs fulfilled by good inventory contro C. The student will be able to complete a list of the national codin system for popularity of parts

UNIT: PARTS SPECIALIST - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Appling math for the parts specialist	A. Terms and definitions B. Decimal equivalent chart C. Fractions D. Decimals E. Percent	A. Functional reading skills B. Vocabulary C. Signal words D. Parts of textbook E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers B. Common fractions C. Decimals D. Percentages E. Formulas		A. The student will be able to match terms related to applied math for parts specialist with correct definitions B. The student will be able to list three advantages of a decimal equivalent chart C. The student will be able to list two uses for fractions and decimal equivalents D. The student will be able to demonstrate the ability to solve basic math problems using fractions, decimals and percentages
IV. Utilizing related counter skills	A. Terms and definitions B. Procedure for accepting checks C. Procedure for accepting credits cards D. Procedure for accepting money orders and travelers checks	A. Functional reading skills B. Vocabulary C. Signal words D. Parts of textbook E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers B. Decimals		A. The student will be able to match terms concerning related counterskills with their correct definition B. The student will be able to select true statements concerning the procedure for accepting checks and credit cards C. The student will be able to complete a list of special precautions for handling money orders & travelers cks

UNIT: PARTS SPECIALIST - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Selling merchandising	A. Terms and definitions B. Basic sales steps C. Trails of a successful salesperson D. Procedure for waiting on customers E. Basic display arrangements F. Advertising media	A. Functional reading skills B. Vocabulary C. Signal words D. Parts of textbook E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills			A. The student will be able to match terms related to sales and merchandising with their correct definitions B. The student will be able to arrange in order five basic sale steps C. The student will be able to select from a list, traits of a successful salesperso D. The student will be able to arrange in order the procedure for waiting on a customer E. The student will be able to identify basi display arrangements and purpose of displays F. The student will be able to discuss major types of advertising media

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Repairing wooden hulls	A. Maintenance B. Off season storage C. Repair of leaks D. Identifying and correcting hooks and rockers E. Refinishing	A. Vocabulary B. Fact/Opinion distinction C. Parts of manual D. Following directions E. Outlining and note taking F. Oral communication		A. Weather Effects of sun (Ultra-violet rays) on boat finish	A. The student will be able to prepare a list of preventative maintenance procedure for wooden boats B. The student will be able to delineate the methods used to repai planking, stern or keel, and transon leaks C. The student will be able to identify or illustrate a boat with a hook and a rocker in its bottom D. The student will be able to list the step in refinishing painte and varnished surface

UNIT: OXY-ACETYLENE EQUIPMENT AND PROCEDURES

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding oxy-acetylene equipment	A. Characteristics of oxygen and acetylene gases B. Oxygen and acetylene cylinders C. Regulators D. Hoses E. Torches and tips F. Safety G. Setting up the equipment H. Safety exam	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook E. Following directions F. Outlining and note taking G. Spelling H. Oral communication I. Test taking skills		A. Heat B. Properties of oxygen and acetylene	A. The student will be able to delineate the properties of oxygen and acetylene B. The student will be able to delineate the construction, use and safety hazards of oxygen and acetylene cylinders C. The student will be able to differentiate between oxygen and acetylene hoses and regulators D. The student will be able to identify part of welding and cutting torches E. The student will be able to delineate the do's and don'ts regarding the use of an oxy-acetylene outfit F. The student will be able to demonstrate proper set up, lighting and tear down of oxy-acetylene equipment

UNIT: OXY-ACETYLENE EQUIPMENT AND PROCEDURES - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
II. Adjusting and testing flames	A. Neutral, carbonizing and oxidizing flames	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook E. Following directions F. Outlining and note taking G. Spelling H. Oral communication I. Test taking skills		A. Heat B. Characteristics of various flames	A. The student will be able to light a welding torch and set flame to oxidizin carbonizing and neutral patterns
III. Fusion welding and brazing	A. Fusion welding sheet metal and steel plate With and without filler rod B. Brazing with bronze filler rod	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook E. Following directions F. Outlining and note taking G. Spelling H. Oral communication I. Test taking skills		A. Heat B. Characteristics of various flames	A. The student will be able to demonstrate a fusion weld of mild steel materials B. The student will be able to demonstrate bronze brazing of mil steel material

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
IV. Flame cutting	A. Flame cutting of mild steel plate ¼" to ½"	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook E. Following directions F. Outlining and note taking G. Spelling H. Oral communication I. Test taking skills		A. Chemical reaction between heated steel and pure oxygen	A. The student will be able to demonstrate the flame cutting (burning) of a steel plate
V. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: CORROSION CONTROL

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding corrosion control	A. Terms and definitions B. Marine corrosion 1. Locating 2. Causes 3. Prevention C. Types of corrosion 1. Chemical 2. Electrical 3. Mechanical	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication		A. Chemical reactions B. Electrolysis C. Galvanic corrosion	A. The student will be able to delineate chemical, mechanical and electrical corrosion B. The student will be able to delineate the three basic factors to consider in the approach to marine corrosion
II. Controlling corrosion	A. Information sheet listing eleven basic rules for controlling corrosion	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication		A. Chemical reactions B. Electrolysis C. Galvanic corrosion	A. The student will be able to delineate the eleven basic rules for controlling corrosion

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Troubleshooting boat wiring problems	A. Wiring conditions causing corrosion 1. Cross grounding 2. Voltage drop B. Voltmeter checks for 1. Cross grounding 2. Voltage drop	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication		A. Chemical reactions B. Electrolysis C. Galvanic corrosion	A. The student will be able to delineate the terms cross grounding and voltage drop as conditions causing corrosion
IV. Utilizing sacrificial zincs	A. Protective zincs B. Application C. Factors affecting performance D. Size and types E. Monitoring	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication		A. Chemical reactions B. Electrolysis C. Galvanic corrosion	A. The student will be able to delineate the use of zincs in fighting corrosion

UNIT: CORROSION CONTROL - CONTINUED

TOPIC:

OME	TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
ll be ate the four heory of ll be everal of compared	Bonding	A. Terms and definition B. Purpose C. Methods and wire size	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication		A. Chemical reactions B. Electrolysis C. Galvanic corrosion	A. The student will be able to define bondin and state the purpose of same B. The student will be able to layout a bond ing system for a hypothetical boat
ll be est run, e test- own a engine	Analysis of impressed current systems	A. Operation B. Components C. Polarization	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication		A. Chemical reactions B. Electrolysis C. Galvanic corrosion	A. The student will be able to delineate th operation of an "impressed current system" for controll ing corrosion
	Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: DIESEL MARINE ENGINES

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Distinguishing the features of diesel engines	A. High speed gas engines versus diesel engines B. Superchargers D. Diesel service applications	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook/ manual E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers B. Weights and measurements C. Ratio and proportion	A. Internal friction in marine engines B. Flow of gases from positive to negative pressure C. Hydraulics Lubrication system	A. The student will be able to list three essential differences between gas and diesel engines B. The student will be able to delineate the function and operation of a supercharger C. The student will be able to list at least five service applications for diesel engines
II. Analyzing the Cummins Diesel Engine using the course workbooks	A. Ten student workbooks covering the following engine elements 1. Cylinder block 2. Components of block 3. Cylinder head 4. Valve and injector trains 5. External components and accessories 6. Fuel systems 7. Air systems 8. Exhaust systems 9. Lube systems 10. Cooling systems	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook/ manual E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers B. Weights and measurements C. Ratio and proportion	A. Internal friction in marine engines B. Flow of gases from positive to negative pressure C. Hydraulics Lubrication system	A. The student will be able to complete the ten student workbooks working at his/her own pace in a self-directed manner

UNIT: DIESEL MARINE ENGINES - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Analysis of diesel engines	A. Delineate the diesel four stroke cycle B. Delineate the diesel two stroke cycle C. Pros and Cons of diesel engines	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook/ manual E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills	A. Whole numbers B. Weights and measurements C. Ratio and proportion	A. Internal friction in marine engines B. Flow of gases from positive to negative pressure C. Hydraulics Lubrication system	A. The student will be able to delineate the diesel two and four stroke cycle theory of operation B. The student will be able to list several pros and cons of diesel engines compared to gas engines
IV. Test running a diesel marine engine	A. Identify lab engine: 12 h.p. "Yanmar" diesel sailboat auxiliary - 2 cylinder B. Maintenance/running checks C. Stunt-up procedures D. Shut down and secure engine	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of textbook/ manual E. Following directions F. Outlining and note taking G. Problem solving H. Spelling I. Oral communication J. Test taking skills		A. Internal friction in marine engines B. Flow of gases from positive to negative pressure C. Hydraulics lubrication system	A. The student will be to start up, test run, perform routine testing and shut-down a marine diesel engine

UNIT: OUTDOOR BOAT YARD OPERATIONS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Preparing facility	A. Terms and definitions B. School boat yard and commercial yards 1. Design 2. Operation 3. Maintenance 4. Security	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills	A. Measurements	A. Weather Effects on stored boats B. Fire hazards	A. The student will be able to delineate a "boat yard" B. The student will be able to list several methods of maintainin boat yard security and the pros and cons of each
II. Utilizing boat yard equipment	A. Vehicles B. Trailers C. Hoist and lifting equipment D. Chocking E. Jacks F. Rollers G. Pressure washer H. Miscellaneous	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills		A. Physics mechanical advantage of various pieces of moving and lifting equipment	A. The student will be able to prepare a list of equipment necessary to operate a storage yard handling boats from 16' to 30'

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Boat chocking	A. Vee type chocking B. Adjustable chocking C. Custom cradles	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills	A. Measurements		A. The student will be able to construct a fixed vee types chock to fit a hull assigned by the instructor B. The student will be able to construct an adjustable type chock to fit several miscellaneous hulls of various configuration
IV. Installation of winter cover	A. Why a winter cover? B. Types and cost of covers C. Framing D. Installation and removal of covers	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills	A. Measurements	A. Protecting from weather and effects of weather	A. The student will be able to frame and cover a 16' - 18' boat with a tarpaulin and a custom fitted winter cover

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Analyzing tow vehicles and hitch classes	A. Tow vehicles (G.V.W.R.) B. Hitch classes	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills	A. Weights and measurements		A. The student will be able to identify various tow vehicles and their G.V.W. rating B. The student will be able to delineate the four classes of trailer hitches
VI. Analyzing trailer types and using a highway check list	A. Trailers 1. Yard trailers 2. Over the road trailers B. Highway check list and safety	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills			A. The student will be able to identify various types of boat trailers B. The student will be able to delineate the highway check list for safe trailer operation

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VIII. Boatloading	A. Outboard hulls Single axle B. Inboard hulls Tandem axle	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills			A. The student will be able to load, move and unload an outboard hull using a single axle trailer B. The student will be able to load, move and unload an inboard hull using a tandem axle trailer
IX. Trailer maintenance	A. Maintenance/Service 1. Winches 2. Safety chains 3. Running lights 4. Coupler 5. Frame 6. Rollers and bunks 7. Tires and rims 8. Wheel bearings	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Following directions E. Outlining and note taking F. Problem solving G. Spelling H. Oral communication I. Test taking skills			A. The student will be able to perform routine maintenance and service on a boat trailer assigned by the instructor
X. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Define and describe outboard powerheads	A. Definition of powerhead B. Components C. Accessory items D. Auxiliary systems	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation of charts I. Problem solving J. Spelling K. Oral communication L. Test taking skills		A. Physics Two stroke cycle principle	A. The student will be able to describe an outboard motor powerhead as relates to its basic components
II. Piston, rings and wrist pins	A. Function B. Construction and design C. Handling D. Precautions	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation of charts I. Problem solving J. Spelling K. Oral communication L. Test taking skills	A. Weights and measurements	A. Applied physics 1. Heat and expansion of gases 2. Heat transfer	A. The student will be able to describe the function and design of two types of outboard motor pistons and piston ring assemblies

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Connecting rod, crankshaft and flywheel	A. Function B. Construction and design C. Bearings 1. Friction 2. Non-friction	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation of charts I. Problem solving J. Spelling K. Oral communication L. Test taking skills	A. Weights and measurements	A. Applied physics Friction	A. The student will be able to delineate the function and design of outboard motor connecting rods, crankshafts and flywheels B. The student will be able to differentiate between friction and non-friction bearings
IV. Engine cylinders and crankcase	A. Function B. Construction C. Cylinder heads D. Bleeder system	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation ofcharts I. Problem solving J. Spelling K. Oral communication L. Test taking skills	A. Weights and measurements	A. Applied physics Friction	A. The student will be able to delineate the function and design of an outboard motor cylinder and crankcase assembly

UNIT: OUTBOARD MOTOR POWERHEAD CONSTRUCTION AND MAINTENANCE - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Powerhead disassembly and inspection	A. Introduction to disassembly procedure B. Disassemble powerhead (service manual) C. Inspecting parts	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation of charts I. Problem solving J. Spelling K. Oral communication L. Test taking skills	A. Measurements Decimals B. Estimating		A. The student will be able to delineate how to prepare an outboard motor for a complete powerhead teardown B. The student will be able to disassemble a powerhead following instructions in service manual C. The student will be able to inspect all parts of service-ability
VI. Powerhead reassembly	A. Prepare parts order and procure new parts as required B. Reassemble powerhead (service manual)	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpreation of charts I. Problem solving J. Spelling K. Oral communication L. Test taking skills			A. The student will be able to prepare a parts list for all new parts required B. The student will be able to reassemble a powerhead following instructions in the service manual

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VII. Start-up/ Break-in	A. Marvel Mystery oil in first tank of gas B. Check timing and synchronization C. Test run in test tank D. Retorque cylinder heads E. Clean and paint engine F. Instruct customer on proper operating procedure Break-in	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of textbook/ manual F. Following directions G. Outlining and note taking H. Interpretation of charts I. Problem solving J. Spelling K. Oral communication L. Test taking skills			A. The student will be able to tank test engine and set proper ignition timing NOTE: engine must pump, shift, charge and attain maximum R.P.M. as required. B. The student will be able to clean and paint the engine and deliver to customer with proper operating procedures
VIII. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR IGNITION SYSTEMS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding outboard motor ignition systems	A. Functions of ignition system B. Common source of trouble C. Types of ignition systems	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Interpretation of diagrams and charts H. Test taking skills I. Problem solving J. Spelling K. Oral communication			A. The student will be able to delineate the function of an ignition system and list three types of systems found on outboard motors
II. Understanding outboard motor magneto	A. Theory of operation Magnetic induction B. Components of a flywheel magneto C. Service and test flywheel magneto	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinc- D. Parts of manual E. Following directions F. Outlining and note taking G. Interpretation of diagrams and charts H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Measure air gaps Decimal	A. Physics 1. Magnetism 2. Electricity	A. The student will be able to identify the components of a flywheel magneto and delineate the theory of operation B. The student will be able to tear down, tes and reassemble an outboard motor flywhee magneto

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Capactior Discharge Ignition (C.D.I.)	A. Theory of operation B. Components 1. Battery 2. Magneto capacitor discharge ignition C. Advantages D. Troubleshooting Test equipment	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Interpretation of diagrams and charts H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Physics 1. Magnetism 2. Electricity	A. The student will be able to identify the components of a magneto capacitor discharge ignition system and delineate the theory of operation B. The student will be able to list at least four advantages of a C.D.I. system over a conventional ignition system C. The student will be able to perform basic troubleshooting of a Mercury and OMC C.D.I. system
IV. Spark plugs	A. Function B. Construction C. Types Sales symbols D. Installation and maintenance Helicols E. Pre-ignition and detonation F. Voltage requirements	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Interpretation of diagrams and charts H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Applied physics Heat transfer B. Effects of heat, air gap, compression and polarity on electrical charge	A. The student will be able to identify or list the parts of a spark plug B. The student will be able to delineate thread size, heat range J-gap and surface gap spark plugs C. The student will be able to delineate pre-ignition and detonatio and list the causes of each D. The student will be able to list the cause of increased plug voltage

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Safety precautions	A. Stray sparks on arcing in the presence of gasoline B. High tension voltage shocks C. Use of test equipment on high tension wires	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Interpretation of diagrams and charts H. Test taking skills I. Problem solving J. Spelling K. Oral communication			A. The student will be able to list or delineate the safety precautions to be observed when servicing or testing outboard motor ignition systems
VI. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR FUEL SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding marine fuel systems	A. Safety precautions 1. Fires 2. Explosions B. Motor fuels Octane rating C. Typical fuel system D. Fuel system maintenance E. Fire extinguishers	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Chemical reactions B. Octane rations and fuel volitility C. Chemistry of fire Fire triangle	A. The student will be able to list and delineate the fueling safety precautions B. The student will be able to illustrate a typical marine fuel system C. The student will be able to describe how to perform typical fuel system maintenanc D. The student will be able to delineate a class "A", "B" and "C" fire extinguisher and how each unit extinguishes a fire
II. Two cycle carburetor theory	A. Function/operation of a typical carburetor B. Carburetor fundamentals/venturi principle	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Ratio and proportion	A. Applied chemistry Rich and lean fuel mixtures B. Applied physics Venturi principle	A. The student will be able to delineate the function/operation of a typical outboard motor carburetor B. The student will be able to delineate the venturi principle as it relates to a carburetor

UNIT: OUTBOARD MOTOR FUEL SYSTEM - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Carburetor types and circuits	A. Types 1. Suction feed 2. Automotive B. Circuits (five)	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Applied physics Flow of liquids and gases due to pressure differential	A. The student will be able to list and delineate the five circuits utilized in a typical outboard motor carburetor
IV. Carburetor settings	A. Current and non-current models B. Float settings C. Needle valve settings D. Choke/throttle butterfly settings E. Synchronization 1. Carburetor 2. Ignition	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication			A. The student will be able to set float drop and level on an outboard carburetor B. The student will be able to check choke and throttle butterflies for correct operation C. The student will be able to set synchronization on a typical outboard motor

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Fuel tank and pump operation	A. Types of outboard motor fuel systems B. Fuel pump operation and components C. Fuel tank operation and components	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Applied physics 1. Pressures 2. Vacuums acting on a liquid	A. The student will be able to list and delir eate the three types of fuel systems found on outboard motors B. The student will be able to delineate the operation of pressure/ vacuum fuel pump and fuel tank
VI. Fuel/oil mixtures	A. Importance of proper oil/fuel mixing B. Combustion of fuel/oil mixture (review detonation) C. What lube oil must accomplish (five functions) D. Fuel consumption	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Ratio and proportion	A. Chemistry of lubricating oils Properties	A. The student will be able to list and delir eate the five functior of an outboard motor oil/gas mixture B. The student will be able to delineate and give an example of the fuel consumption for a 50 C.I.D. outboard motor at full throttle range
VII. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR COOLING SYSTEMS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding outboard motor cooling systems	A. Why a cooling system B. Heat distribution C. Two methods of cooling	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Ratio and proportion	A. Applied physics 1. Effect of heat on metal engine parts 2. Distribution of heat through various mediums	A. The student will be able to list and delineate the reasons for a cooling system for an internal combustion engine B. The student will be able to differentiate the amount of heat disapated through the variou mediums
II. Water pumps	A. Two types and their components B. Low speed operation of rotary type C. High speed operation of rotary type	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Applied physics Effect of pressure and vacuum on a liquid	A. The student will be able to delineate the operation of a rotary type outboard motor water pump through high and low speed cycles

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Thermostatic controls	A. Thermostat B. Pressure control valve (P.C.V.) C. Wet-sleeve exhaust	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Appled physics Effect of heat on bimetal element	A. The student will be able to delineate the function and operation of an outboard motor thermostat and a pressure control valve
IV. Servicing cooling systems	A. Pump kits B. Thermostat C. Head gasket D. Exhaust leaks E. Lights, gauges, horns, sending units, etc.	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Inferences E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication			A. The student will be able to list the components of a water pump kit B. The student will be able to list and delineate the areas to concentrate on when servicing an outboard motor cooling system
V. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR GEARCASES

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding outboard motor gearcases/lower units	A. Lower unit 1. Nomenclature 2. Components B. Three types of gearcases 1. Non-reversing 2. Full Reverse (pivoting) 3. Forward, neutral, reverse	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Test taking skills G. Problem solving H. Spelling I. Oral communication			A. The student will be able to list and delineate the major components of an outboard motor lower unit B. The student will be able to list and delineate the three types of gearcases found on outboard motors
II. Manual shift gearcase	A. Components B. Operation	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Test taking skills G. Problem solving H. Spelling I. Oral communication	A. Gear ratio	A. Applied Driven and driven gear trains	A. The student will be able to identify the components of a manual shift outboard motor gearcase B. The student will be able to delineate the operation of a manual shift outobard motor gearcase

UNIT: OUTBOARD MOTOR GEARCASES - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Hydraulic shift gearcase	A. Types (OMC) 1. Electro hydraulic 2. Mechanical with hydraulic assist B. Components C. Operation	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Test taking skills G. Problem solving H. Spelling I. Oral communication	A. Gear ratio	A. Applied physics Driven and driven gear trains	A. The student will be able to identify the components of a mechanical/hydraulic assist OMC gearcase B. The student will be able to delineate the operation of a mechanical/hydraulic assist OMC gearcase
IV. Gearcase service and maintenance	A. Gear oil 1. Drain 2. Fill 3. Check B. Test for leaks 1. Pressure test 2. Vacuum test	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Test taking skills G. Problem solving H. Spelling I. Oral communication			A. The student will be able to drain and refill an outboard motor gearcase with correct lube B. The student will be able to pressure and vacuum test a gearcase for leaks

UNIT: OUTBOARD MOTOR GEARCASES - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
V. Gearcase disassembly, inspection and reassembly	A. Disassemble sequence of events (service manual) B. Wast and inspect all parts C. Discard all gaskets, seals and o-rings D. Reassemble E. Pressure check F. Test assembled unit	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Test taking skills G. Problem solving H. Spelling I. Oral communication			A. The student will be able to disassemble, clean and inspect, and reassemble a full gearshift outboard motor gearcase
VI. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR CHARGING SYSTEMS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding alternators	A. Purpose and function B. Types and options C. Components D. Theory of operation	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Interpretation of diagrams G. Test taking skills H. Problem solving I. Spelling J. Oral communication		A. Physics 1. Magnetism 2. Electricity	A. The student will be able to identify the components of an outboard motor flywheel alternator and delineate the theory of operation
II. Troubleshooting outboard alternators	A. Undercharged battery B. Visual and preliminary inspection 1. Battery 2. Wiring 3. Excessive loudness C. Meter testing 1. Rectifier (diodes) 2. Windings	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Interpretation of diagrams G. Test taking skills H. Problem solving I. Spelling J. Oral communication		A. Applied Physics 1. Use of meters 2. Properties of electricity	A. The student will be able to perform a visual inspection of a defective alternator charging system for possible trouble spots B. The student will be able to perform a complete meter test of the entire outboard motor charging system to locate trouble

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Electrical signs and symbols and reading schematics	A. Wiring diagrams versus schematic B. Commonly used electrical signs and symbols (service manual)	A. Functional reading skills B. Vocabulary C. Parts of manual D. Following directions E. Outlining and note taking F. Interpretation of diagrams G. Test taking skills H. Problem solving I. Spelling J. Oral communication			A. The student will be able to identify several random unlabeled electrical symbols B. The student will be able to trace a randor electrical circuit from an outboard or inboard motor using a schematic or wiring diagram
IV. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR INSTALLATION AND MAINTENANCE

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Motor familiarization - mounting and dismounting	A. Safe handling of outboard motors for personal and product safety B. Removing motor from boat C. Installing motor on workstand D. Rigging motor on boat	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Test taking skills H. Problem solving I. Spelling J. Oral communication			A. The student will be able to remove an outboard motor from a boat and install it on a workstand using handling equipment available B. The student will be able to rig an outboard motor on a boat for delivery to a customer
II. Test tank operation	A. Types of tanks and test propellers B. Lifting equipment C. Starting carts 1. Commercial 2. School made D. Safety	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Test taking skills H. Problem solving I. Spelling J. Oral communication			A. The student will be able to install and operate various outboard motors in the test tanks available using the stunting carts available

UNIT: OUTBOARD MOTOR INSTALLATION AND MAINTENANCE - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Winterizing and maintenance	A. Winterization Prepare engine for extended storage B. Pre-season preparation C. Mid-season maintenance	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Test taking skills H. Problem solving I. Spelling J. Oral communication		A. Applied chemistry Factors affecting the corrosion of metals during storage	A. The student will be able to winterize an outboard motor using the information sheet provided
IV. Submerged outboard motors	A. Define submerged motors B. Variations in service procedures (manufacturers, horsepower, etc.) C. Priorities/temporary service D. De-submerging procedure 1. All engine systems 2. Cylinder and crankcase assembly 3. Boat electrical system	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Parts of manual E. Following directions F. Outlining and note taking G. Test taking skills H. Problem solving I. Spelling J. Oral communication			A. The student will be able to list and/or perform the necessary steps to return a submerged motor to normal service
V. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: OUTBOARD MOTOR TROUBLESHOOTING AND ESTIMATING

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Troubleshooting	A. Systematic diagnosis B. Service manual C. Troubleshooting check lists D. Available test equipment	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Note taking H. Interpretation of charts I. Test taking skills J. Problem solving K. Oral communication L. Spelling			A. The student will be able to delineate how the technician would approach a malfunctioning outboard motor utilizing a systematic approach to troubleshooting
II. Troubleshooting practical engine diagnosis	A. Engine will not start B. Engine stops running C. Malfunctioning ignition system D. Engine overheats E. Engine will not charge F. Engine will not shift	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Note taking H. Interpretation of charts I. Test taking skills J. Problem solving K. Oral communication L. Spelling			A. The student will be able to correctly troubleshoot six malfunctioning outboard motors using appropriate service manual and available test equipment

UNIT: OUTBOARD MOTOR TROUBLESHOOTING AND ESTIMATING - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Estimating repairs	A. Estimating an outboard motor repair or performing the repair are synonomous B. Prepare parts list C. Compute labor charge Flat rate manual D. Add sales tax and total the bill	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Note taking H. Interpretation of charts I. Test taking skills J. Problem solving K. Oral communication L. Spelling	A. Whole numbers B. Decimals C. Percentages D. Estimating		A. The student will be able to prepare two estimates for common outboard motor repairs with the estimates to include 1. Parts 2. Labor 3. Sales tax 4. Total invoice

UNIT: FIBERGLASS HULL REPAIRS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Understanding fiberglass reinforced plastic (F.R.P.) construction and repair	A. Define fiberglass reinforced plastic hulls B. Advantages of fiberglass reinforced plastic construction regarding repairs C. Three types of construction D. Three types of repairs E. Glossary of technical terms	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Applied chemistry 1. Properties of resins 2. Fiberglass cloth reinforcing	A. The student will be able to list and delineate four advantages of fiberglass reinforced plastic construction regarding repairs B. The student will be able to list and delineate the three processes used to manufacturer fiberglas reinforced plastic hulls C. The student will be able to list and delineate the three types of fiberglass reinforced plastic repairs D. The student will be able to define several terms randomly selected from glossary of technical terms

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
II. Understanding the general list of materials, tools and equipment	A. Examples of material (information sheet) B. Examples of tools and equipment (information sheet)	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication			A. The student will be able to identify and delineate material and tools used in fiberglass repairs from the list provided
III. Mixing and applying resins	A. Nature of resins 1. Polyester B. Safety precautions C. Mixing resins 1. Colors 2. Catalyst D. Application	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Ratio and proportion	A. Applied chemistry 1. Chemical reaction between resin (polyester) and catalyst (M.E.K.) 2. Curing of catalized resin 3. Toxic fumes	A. The student will be able to list and delineate the do's and don'ts pertaining to the mixing of resins B. The student will be able to list and delineate the safety precautions pertaining to the mixing of resins C. The student will be able to mix and apply resin and cloth to a simulated fiberglass patch

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
IV. Structural and cosmetic repairs	A. Types of structural repairs B. Materials C. Tools and equipment D. Repair procedure E. Finishing repaired area - cosmetic repairs	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Ratio and proportion	A. Applied chemistry 1. Chemical reaction between resin (polyester) and catalyst (M.E.K.) 2. Curing of catalized resin 3. Toxic fumes	A. The student will be able to repair a damaged fiberglass hull including 1. Preparing damaged area 2. Prepare and apply patch 3. Trim and feather cured patch 4. Refinish hull in the area of the repair
V. Refinishing fiberglass reinforced plastic hulls	A. Refinishing methods B. Safety precautions C. Hull preparation D. Painting and gelcoat (manufacturer's specifications) E. Paint application	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication	A. Ratio and proportion	A. Applied chemistry 1. Chemical reaction between resing (polyester) and catalyst (M.E.K.) 2. Curing of catalized resin 3. Toxic fumes	A. The student will be able to prepare a fiberglass hull for painting and paint the hull

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VI. Waxing and polishing	A. Preventative maintenance B. Rubbing and polishing compound C. Waxing D. Frequency	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication			A. The student will be able to list and perform the steps in the compounding and waxing of a fiberglass hull
VII. Bottom painting	A. Types of paints B. Surface preparation 1. New hulls 2. Repaint C. Paint application D. Launch time	A. Functional reading skills B. Vocabulary C. Inferences D. Fact/Opinion distinction E. Parts of manual F. Following directions G. Outlining and note taking H. Test taking skills I. Problem solving J. Spelling K. Oral communication		A. Applied chemistry 1. Antifouling chemicals 2. Toxitity	A. The student will be able to prepare a fiberglass boat bottom for painting B. The student will be able to select proper paint and apply to boat bottom
VIII. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Nautical terminology and hull design	A. Glossary of nautical terms B. Hull designs 1. Contours and profiles 2. Boat bottoms	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Signal words E. Parts of textbook F. Following directions G. Outlining and note taking H. Interpretation of diagrams I. Test taking skills J. Problem solving K. Spelling L. Oral communication			A. The student will be able to define several terms randomly selected from the glossary of nautical terminology B. The student will be able to identify several hull profiles and bottom types from illustrations provided
II. Federal Safe Boating Act	A. Motor boat classes B. Federal equipment check (F.E.C.) C. Courtesy motor boat examination (C.M.E.) D. Safety equipment 1. Required 2. Recommended E. Hull identification number (H.I.N.)	A. Functional reading skills B. Vocabulary C. Fact/Opinion distinction D. Signal words E. Parts of textbook F. Following directions G. Outlining and note taking H. Interpretation of diagrams I. Test taking skills J. Problem solving K. Spelling L. Oral communication			A. The student will be able to list four classes of motor boats classified under the Federal Safe Boating Act B. The student will be able to list and delineate the eight departments under the Federal equipment check C. The student will be able to prepare a list of recommended safety equipment to have on board a motor boat

UNIT: BOATING FUNDAMENTALS - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Passing a written test	A. Specific test instructions	A. Vocabulary B. Signal words C. Following directions D. Test taking skills E. Spelling F. Functional reading skills			A. The student will be able to complete a written test with 70% accuracy

UNIT: ON THE WATER ACTIVITIES

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Boat trailering and launching	A. Launch boat and secure to dock B. Haul boat and secure to trailer	A. Functional reading skills B. Vocabulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to launch a 17' to 25' boat and secure to a dock B. The student will be able to haul out a 17' to 25' boat and secure to a trailer
II. Boating skills and seamanship	A. Operate a boat 1. Inboard 2. Outboard 3. Stern drive B. Anchoring, docking and mooring procedures	A. Functional reading skills B. Vocabulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to operate a 17' to 25' motor boat performing various manuvers as prescribed by the instructor B. The student will be able to perform anchoring, docking and mooring manuvers

UNIT: ON THE WATER ACTIVITIES - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
III. Aids to navigation	A. Channel markers used in local waters B. Using a N.O.A.A. nautical chart	A. Functional reading skills B. Vocabulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to identify and differentiate between the various channel markers used in local waters B. The student will be able to plot a course using a N.O.A.A. nautical chart
IV. Engine service and repair	A. Emergency repairs afloat B. Minor outboard service afloat	A. Functional reading skills B. Vocabulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to R and R the spark plugs and propeller on an outboard motor B. The student will be able to diagnose and repair a malfunctioning marine engine C. The student will be able to diagnose and repair or replace miscellaneous onboard equipment

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VI. Marine salvage techniques	A. Salvage (raise) a sunken outboard hull B. Emergency repairs to insure water-tight integrity	A. Functional reading skills B. Vocabulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to refloat an outboard hull that sank in a slip or secured to a dock or bulkhead B. The student will be able to diagnose and perform emergency repairs to a sinking hull
VII. Boat towing procedures	A. In-line tow B. Navy tow	A. Functional reading skills B. Vocabulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to rig and tow a disabled hull using the in-line and navy tow methods

UNIT: ON THE WATER ACTIVITIES - CONTINUED

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
VIII. Safety on the water	A. Fire extinguishers B. Visual distress signals C. Use of P.F.D.'s D. Safety precautions when servicing boats and motors E. Float plan	A. Functional reading skills B. Vocbulary C. Following directions D. Test taking skills E. Problem solving F. Oral communication			A. The student will be able to perform an on board inspection of fire extinguishers and I.D. as to type, size and use B. The student will be able to extinguish a small bilge fire C. The student will be able to delineate the use of visual distress signals D. The student will be able to identify four types of P.F.D.'s and demonstrate their use E. The student will be able to prepare a hypothetical float plan following U.S.C.G recommendations